List of tasks

Everyone
12/9/2015

Some milestones

- Collaboration meeting Jan. 15

- DOE Lab R&D review Feb. 2016

- DOE Lab intensity frontier review June-July 2016 ?

- Technical design for proto-dune. June 2016

- Collab meeting May 2016 ?

- Settle on protodune 2016

High level work break down (for work beyond current model)

- Computing model - beyond current ideas to benefit from HPC and other models.

- Software structure - including integration with larsoft.

- Detector optimization - using new tools

- Physics case studies - using new tools

- This also has to be coordinated with ongoing and mature work on LarSoft.

Detector optimization

- What are the physics requirements on electronics performance.
- What is the optimum APA dimension ? This is coupled to wire angle, wire length, and any potential intentional distortion.
- Generalize the problem of wire geometry beyond wire pitch to tessellation,wire angle, and number of induction planes.
- What is the optimum angle for neutrino beam to allow maximum efficiency for golden events ?
- Advanced geometries such as the accordion ?
- Optimization of electric field
- Field response calculations.

Physics case studies

- **The most important physics requirement is the need to reconstruct multi-track events with >80% efficiency and measure their energy.**
- This has not been demonstrated yet. There are two major geometric issues:
  - The forward-going nature of high energy beam events cause ambiguities in pattern recognition.
  - Tracks going towards the wire plane have poor resolution on the induction plane.
- Other issues are
  - What fraction of energy is in multiple protons and neutrons that emerge from vertex and how to correct it.
  - What is the effect of signal to noise on e/gamma separation
- Hi priority
  - What fraction of golden events are affected by vertical ambiguity
  - Document Various event characteristics.
- E/gamma separation for selected topologies.
- Pio detection for selected topologies.
- Muon momentum determination from scattering.
- Two particle separation for selected topologies
- Mu/Pi identification based on DeDx and end point.
- kaon and proton identification and energy measurement